Attorney Docket No. 06618-505001
Serial No.: 09/491,353
Amendment dated December 4, 2003
Reply to Office Action dated September 5, 2003

Amendment to the Claims:

This listing of claims replaces all prior versions, and

listings, of claims in the application:

1. (Currently Amended) A method of performing finite

element analysis on a shell including:

[(a)] modeling a geometry of the shell as a mesh, ~~using~~

~~subdivision surfaces of a type formed by recursively subdividing~~

~~a mesh to form a smoothed surface;~~

~~(b)~~ characterizing an environment for the shell, including

environmental factors affecting the mechanical behavior of a

modeled shell;

[(c)] computing a mechanical response of the ~~modeled~~

shell[[,]] modeled as a set of partial differential equations,

at least one of which having a fourth order differential

operator, taking into account a characterized environment, using

a finite element analysis to compute a deformed geometry of the

surface, wherein the finite element analysis uses smooth

subdivision basis functions as shape functions; and

[(d)] outputting a description of the deformed geometry of

the modeled shell as determined from the computed mechanical

response.

2

Attorney Docket No. 06618-505001
Serial No.: 09/491,353
Amendment dated December 4, 2003
Reply to Office Action dated September 5, 2003

2. (Original) The method of claim 1, wherein the environment factors includes loading conditions, material properties, and boundary conditions for the modeled shell.

3. (Original) The method of claim 2, wherein the loading conditions includes an indication of applied forces.

4. (Original) The method of claim 2, wherein the loading conditions includes an indication of thermal loading.

5. (Original) The method of claim 1, further including outputting indications of the characterized environment.

6 - 8. (Cancelled)

9. (Currently Amended) A system for performing finite element analysis on a shell including:

(a)    means for modeling the geometry of the shell as a mesh ~~using subdivision surfaces which are formed by recursively subdividing a mesh to form smoothed surface~~;

(b)    means for characterizing an environment for the shell, including environmental factors affecting the mechanical behavior of the modeled shell;

3

Attorney Docket No. 06618-505001
Serial No.: 09/491,353
Amendment dated December 4, 2003
Reply to Office Action dated September 5, 2003

(c)   means for computing the mechanical response of the

modeled shell <u>as a set of differential equations, at least one</u>

<u>of which having a fourth order differential operator</u>, taking

into account the characterized environment, using a finite

element analysis <u>with smooth subdivision basis functions as</u>

<u>shape functions</u>; and

(d)   means for outputting a description of the geometry of

the modeled shell as determined from the computed mechanical

response.


10.  (Original) The system of claim 9, wherein the

environment factors includes loading conditions, material

properties, and boundary conditions for the modeled shell.


11.  (Original) The system of claim 10, wherein the loading

conditions includes an indication of applied forces.


12.  (Original) The system of claim 10, wherein the loading

conditions includes an indication of thermal loading.


13.  (Original) The system of claim 9, further including

means for outputting indications of the characterized

environment.

4

Attorney Docket No. 06618-505001
Serial No.: 09/491,353
Amendment dated December 4, 2003
Reply to Office Action dated September 5, 2003


14 - 15. (Cancelled)


16.    (Currently Amended) A system for performing finite element analysis using subdivision basis functions, including:

(a)    means for inputting a mesh comprising a set of data points each having connectivity to neighboring data points, the mesh defining physical parameters;

(b)    means for specifying an initial state for the mesh;

(c)    means for defining a set of ~~linear~~ differential equations comprising a stiffness matrix and an external forcing vector, at least one such equation having a fourth order differential operator;

(d)    means for solving the set of ~~linear~~ equations as applied to the mesh;

(e)    means for outputting the solution to the set of ~~linear~~ equations as defining a modification of the initial state of the mesh based on the stiffness matrix and in response to the external forcing vector ~~based on subdivision surfaces which are recursively formed from an initial mesh and which produce a smooth surface~~.


5

Attorney Docket No. 06618-505001
Serial No.: 09/491,353
Amendment dated December 4, 2003
Reply to Office Action dated September 5, 2003

17.    (Currently Amended)   A computer program, residing on a
computer-readable medium, for performing finite element analysis
on a shell, the computer program comprising instructions for
causing a computer to:

(a)    model the geometry of the shell ~~using subdivision
surfaces by recursively subdividing a mesh to form a final
smoothed surface~~;

(b)    characterize an environment for the shell, including
environmental factors affecting the mechanical behavior of the
modeled shell;

(c)    compute the mechanical response of the modeled shell,
<u>as a set of partial differential equations, at least one of
which having a fourth order differential operator,</u> taking into
account the characterized environment, using a finite element
analysis <u>wherein the finite element analysis uses smooth
subdivision basis functions as shape functions</u>; and

(d)    output a description of the geometry of the modeled
shell as determined from the computed mechanical response.


18.    (Original) The computer program of claim 17, wherein
the environment factors includes loading conditions, material
properties, and boundary conditions for the modeled shell.

6

19. (Original) The computer program of claim 18, wherein the loading conditions includes an indication of applied forces.

20. (Original) The computer program of claim 18, wherein the loading conditions includes an indication of thermal loading.

21. (Original) The computer program of claim 17, further including instructions for causing the computer to output indications of the characterized environment.

22. (Original) The computer program of claim 17, wherein the finite element analysis uses subdivision basis functions as shape functions.

23. (Original) The computer program of claim 17, wherein the finite element analysis uses suitably smooth shape functions.

24-26. (Canceled)

7